

The Canadian Entomologist

VOL. LIX.

ORILLIA, FEBRUARY, 1927.

No. 2.

BIOLOGICAL NOTES ON ZEIRAPHERA FORTUNANA KFT. AND RATZBURGIANA RATZ. (EUCOSMIDAE, LEPID.)*

BY A. H. MACANDREWS,

Fredericton, N. B.

On June 25th and 26th an old pasture supporting a thrifty growth of white spruce from 3 to 10 feet in height was inspected for spruce budworm injury. Very few budworm larvae were found but large numbers of *Zeiraphera* larvae were present. In the course of the study it developed that these were chiefly *Z. ratzeburgiana* with about 40% *Z. fortunana*. An older pasture adjoined and the growth was 15 to 25 feet in height. Here the relation was reversed. *Z. fortunana* formed over 75% and on the larger trees *Z. ratzeburgiana* was not found at all. No attempt was made to separate the larvae, and these figures are based on a study of the moths. In the case of old pastures where the small trees and reproduction were absent only *Z. fortunana* was found. Where the young growth was just taking possession and ranged from 3 to 8 feet, *Z. ratzeburgiana* was the dominant species.

On June 25th the current growth of white spruce was 3 to 6 inches long and both terminals and laterals were heavily infested. A good indication of the presence of the larvae at this time was the persistent cap of scales; on normal twigs this brown cap of bud scales had been shed, on infested twigs the feeding of the larva had webbed the bud scales to the elongating tip, otherwise to casual observation the twig was normal. On close observation it will be noticed that the needles have a peculiar purple tinge while here and there a needle disturbs the orderly overlapping arrangement of the needles by sticking out at right angles to the main axis of the twig. These purple needles hide the feeding larvae; they are cut or partially cut off at the base, but held in their normal position by silk and the uninjured overlapping needles. The larvae feed individually in this manner in their early stages or socially in groups of 4 or 5 while as many as 18 have been found on a twig 6 inches long. The needles on one whole side of a twig may be destroyed in this manner or only a few bunched needles here and there on the twig may suffer. The larvae feeding at the tip may sever all the needles surrounding the new terminal buds, first tying the bud scales to the needles and then tying the severed needles to the twig. The needles at this stage are one half to three quarters of their normal length and the larvae are 5 to 7 mm. long, which is the average length of the budworm larva at this time.

It was a common occurrence to find the spruce budworm larvae and the *Zeiraphera* larvae feeding on the same tree, in fact they were often collected on the same twig and during their early stages casual observation failed to separate them, but as the budworm developed it colored up and took on distinguishing markings. The *Zeiraphera* larvae remained a dirty yellowish green color

*—Contribution from the Division of Forest Insects, Entomological Branch, Dept. of Agric., Ottawa.

with an inclination to be sluggish in their movements while the budworm was very active, twitching and thrashing around when disturbed. They also were capable of dropping on a thread but to a much less degree than the budworm and it took a lot of provocation to induce them to drop.

By June 29th the larvae were mature and began to disappear. The needles had reached the full growth and were flaring outwards though elongation at the tip was still going on and the needles there were still appressed. Injury becomes more apparent at this time as more of the needles are twisted out of place and some begin to drop where the supporting silk has weakened. It is only after the larvae have left that the casual observer can notice injury as the injured needles then begin to turn brown and distorted growth is noticeable.

The mature larvae wander a little and then drop to the ground. A few individuals were found exposed on uninjured twigs where they had apparently wandered, after leaving the feeding ground. It was possible to make a big collection one day and two days afterwards find the larvae comparatively rare.

An odd pupa was found here and there on the uninjured foliage. Three or four needles would be webbed together to form a tube-like structure with the pupa inside. These were hard to detect. A few pupae were also found in the frass excrement and silk immediately under the persistent cap of brown scales. Most of the pupae were found naked in the top soil under the trees or even just under the moss on the surface of the ground. Several hundred infested twigs were put in a cage and the larvae pupated in the bottom of the cage, between the layers of twigs, under the scale caps and some remained in their feeding quarters on the twig and pupated in the mass of silk, dead needles and excrement. These latter constructed a frail silken cocoon.

Several young trees had been caged up and the larvae in these pupated under the cap of scales or in the bottom of the cage. Most of them succeeded in escaping from the cage as they are only about 9 mm. long and 2 mm. in diameter at their widest part. The first pupa was found on July 1st and it is interesting to note that the first budworm pupa was found on June 28th. The pupal stage was longer than that of the budworm. The first adult emerged July 20th. The maximum flight period occurred about July 26th, while that of the budworm was on the wane.

Zeiraphera fortunana was much more abundant than *ratzeburgiana* and appeared earlier. The flight period is rather short and by August 3rd *fortunana* was noticeably reduced in numbers and in early localities the flight was over, although *Z. ratzeburgiana* was still plentiful. It was noticed that *ratzeburgiana* seemed to show a preference for the smaller trees. Collecting around a 6 ft. tree was much better than on a 25 ft. tree which would yield nearly all *fortunana* specimens.

There was a noticeable difference in the flight of the two species. *Z. ratzeburgiana* was less active and the moths seldom hovered around the foliage as did *fortunana*. When a limb was disturbed *ratzeburgiana* would make a short rapid flight to a nearby twig and alight, usually on the underside of a needle, lying parallel to the long axis of the needle and close to it. They were quite inconspicuous in this position and were very sensitive to disturbances, dropping

quickly at one's approach; if a bottle was held underneath they would drop into it and apparently had the habit of dropping an inch or so preparatory to flying off.

Z. fortunana on the other hand seemed continually in motion, hovering over the foliage or flitting back and forth from tree to tree. Flight was observed on bright, sunny days, dull, cool days and even when a light rain was falling. In spite of close observation nothing could be learned of the egg laying habits. The moths were observed in copulation on different occasions but after the moths had disappeared no eggs could be found. It is hoped that the work in the spring will fill in the gaps and complete the life history.

It is practically impossible to distinguish between budworm feeding and *Zeiraphera* feeding on young trees unless there are budworm pupal cases or characteristic webbing to go by; with the absence of these or other stages of the insect it is a puzzling problem. In no case was *Zeiraphera* found on balsam, fir, red spruce (*Picea rubens*) or black spruce (*Picea mariana*). The larvae of *Zeiraphera* were most plentiful on the leaders and especially on the terminal twig and as the larvae not only nibbled the base of the needle but also gouged the tissue of the twig itself a deformity of the elongating twigs was brought about, growth continuing on the uninjured side and causing the twig to curl and bend toward the injured side. When this gouging was long and deep the stem was so weakened that it broke off, which was especially true of the thrifty, rapid-growing trees. The leaders 10 to 14 inches long were soft and fleshy and the weakened stem could not support the weight of the moisture-laden succulent foliage; it first drooped, sagged to one side and finally snapped in the first wind. Trees were found that had been injured in this way for several years in succession; each time a lateral had replaced the leader to be killed itself the next year, producing a top that was the exact duplicate of the white pine weevil injury and forming the most important type of injury. The actual feeding injury and defoliation on the branches was not sufficient to materially reduce the increment of the tree or be reflected as retardation in the rings. There did not seem to be much evidence of bud killing. Feeding started after elongation had begun and even when larvae fed at the tip of the twig and webbed down the cap of bud scales the new buds of 1927 usually succeeded in forming and developing.

On July 22nd the feeding injury was most apparent, for the injured foliage had by that time turned brown and started to drop off. Twig elongation was about complete and the deformity was very noticeable, partly calloused feeding scars being also exposed. When feeding is concentrated and severe the tip may break off as stated before or just wilt and dry up for several inches. The usual type of injury appears as stripping down one side or in patches along the stem and much of the injury is confined to the immediate tip of the twig; frequently the numerous adventitious buds along the sides of the stem escape injury. It was sometimes found that the terminal buds of the lateral branches were killed but this was usually the result of injury to the twig below the bud.

NEW SPECIES OF ERYTHRONEURA (HOMOPTERA-CICADELLIDAE).

BY R. H. BEAMER,*

Lawrence, Kansas.

Erythroneura nicholi n. sp.

Color pattern: Strikingly cross-banded throughout. Vertex, white or suffused with yellow. Anterior two-thirds of pronotum, orange-red; posterior third, white. First tegminal band occupying bases of tegmina to a point on costal margin slightly caudad of tip of scutellum, deep orange-red. Second band, white, extending to middle of clavus. Third band, dark orange-red, about as wide as length of costal plaque; connected narrowly along costal margin with first tegminal band. Fourth band, white; rather narrow. Fifth band, golden yellow; somewhat wider than the fourth in middle; much wider at costal margin; margins uneven. Sixth band, white or transparent; narrower than the fifth; extending almost to cross-veins. Seventh band, smoky black; occupying rest of tegmina. Cross-veins, whitish; most of base of cell M_4 transparent; costal plaque, purplish red with a white spot in either end; dorsum of abdomen and most of ventral surface, black or dark brown with the exception of the face between the eyes which shades off into a bright red band marked by several small white spots.

This species falls in the *scutelleris* group in Robinson's key to the species of North American *Erythroneura* and is one of the most strikingly cross-banded species known.

Holotype, male; Santa Rita Mountains, Arizona; altitude, 4500 ft.; Sept. 9, 1925; A. A. Nichol. Deposited in the Snow Entomological Collection, University of Kansas.

Allotype, female; taken at the same place and time by Mr. Nichol.

Erythroneura rubranotata n. sp.

Color pattern: General ground color, yellowish-white. Vertex and pronotum each with a pair of small translucent brownish spots. Tegmina each with a large rather rectangular, bright red spot occupying the base of clavus and another almost equally large rectangular red spot slightly before tip of clavus. Cell M_4 with a small black spot at base. Costal plaque, whiter than rest of tegmina.

This species falls into Robinson's *scutelleris* group near the species *E. rosa* Rob. and *E. rubraza* Rob. although strikingly different from either. Superficially it closely resembles *E. rubroscuta* Gill., but is easily separated from this by having no red on the pronotum or scutellum and by having the vertex more pointed.

Holotype, male; Atchison County, Kansas; July 16, 1924; R. H. Beamer. Deposited in the Snow Entomological Collection, University of Kansas.

Erythroneura septima n. sp.

Color pattern: General ground color, milky-white. Vertex, very slightly suffused with yellow. Pronotum, uniformly white. Scutellum, yellowish with three black spots; two large ones in basal angles and small one at tip. Tegmina marked with fuscous as follows: Black vitta arising on sutural margin of clavus less than half way from scutellum to tip and extending diagonally across wing to middle of costal plaque, thence parallel to plaque almost to its apex. This vitta, not quite as wide as costal plaque, deep velvety fuscous, almost black, with a

*—Contribution from Entomological Laboratories, University of Kansas, Lawrence.

suggestion of orange underlying it. Another fuscous area in shape of a figure seven arising on costal margin at apex of costal plaque, extending diagonally as a narrow parallel-sided vitta to radius; thence widening to cross-veins with tip darkening base of cell M_4 and stem of the seven darkening entire cell R_3 . Dark spot near apex of cell R_1 and a larger one in apex of M_2 . Cross-veins from costal margin to veins M_{1+2} , bright red, remainder white.

This species falls in the *scutelleris* group in Robinson's key, but is easily separated from any of the other species found there by its milky-white color and black markings. The specific name is suggested by the dark markings in the shape of two figure sevens which face each other on the tegmina.

Holotype, female; Douglas County, Kansas; 1925; R. H. Beamer. Deposited in the Snow Entomological Collection, University of Kansas.

***Erythroneura bipentagona* n. sp.**

Color pattern: Vertex, covered by three creamy-white spots each indistinctly outlined with red. Pronotum, fuscous suffused with red except narrow border on anterior margin in middle of which is a rectangular white spot about one-third length of pronotum. Scutellum, brownish except a diamond shaped white spot occupying apex which is suffused with red. Tegmina dark maroon to cross-veins except costal plaques, a creamy-white spot between them and R_1 along costal margin, and two pentagonal, creamy-white spots of about equal area on sutural margin; apical one extending basally from cross-veins to about even with apex of costal plaques and laterally to cubitus; basal one occupying apex of scutellum and extending apically on clavi to a point a little beyond base of costal plaques and laterally almost to claval suture. From cross-veins almost to tip, clouded; a transparent spot in cell M_4 and one extending both in cell R_1 and R_2 ; costal plaque, creamy-white with a darker area at either end.

Superficially this species resembles *E. elegans* McAtee, but since it has a distinct MCu cross-vein falls into the *scutelleris* group where it traces out to *E. rosa* Rob. in the later's key. It is, however, quite distinct from this species in color pattern.

Holotype, female; Douglas County, Kansas; R. H. Beamer. Deposited in the Snow Entomological Collection, University of Kansas.

***Erythroneura vitis* var. *fusco-clava* n. var.**

Color pattern: Ground color, pale yellow. Vertex, whitish, suffused with yellow and spotted with brown translucent spots, base edged with brown. Pronotum and basal two-thirds of scutellum fuscous; posterior third of scutellum, yellowish. Tegmina with three cross-bands, the first two united on clavus; the first band narrow, fuscous, not extending beyond the scutellum; the second, the broadest of the three, fuscous, bordered with red, joined solidly to the first by stripe occupying each clavus; cross-veins, reddish; base of cell M_4 , hyaline; clouded with black from cross-veins to apex; large portion of costal plaque, bluish; mesosternum, fuscous.

It traces to *E. vitis* var. *stricta* McAtee in Robinson's key, but may be easily separated from this variety by the broad fuscous connections of the first and second tegminal bands on the clavus.

Holotype, female; Doniphan County, Kansas; July 22, 1924. R. H. Beamer. Deposited in the Snow Entomological Collection, University of Kansas.

THE DISTRIBUTION OF BREMUS KINCAIDII (COCKERELL). BREMIDAE: HYM.

BY THEODORE H. FRISON,

Urbana, Illinois.

In the Fifty-sixth Report of the Entomological Society of Ontario, Mr. H. L. Viereck records a queen of *Bremus kincaidii* (Cockerell) from "Winter Ft. [specimen is labeled Winter H], Melville I [sland], July 20, 1909 (F. C. Hennessey)." Due to the kindness of Dr. J. McDunnough this specimen was sent to me for examination. It proves to be either an unusually small queen, or a worker, of *Bremus hyperboreus* (Schonherr). I find that Mr. F. W. L. Sladen in the Report of the Canadian Arctic Expedition, 1913-18, Volume III, Part G, p. 29g says under the name *Bombus arcticus* Kirby [= *Bremus hyperboreus* (Schonherr)] that "The Canadian National collection contains another queen taken at Melville island, July 20, 1909, by F. C. Hennessey. Both the Melville island specimens differ from those taken on the mainland in being slightly smaller." Undoubtedly, the specimen recorded by Viereck in the Fifty-sixth Report of the Entomological Society of Ontario is one of the queens previously correctly determined and listed (except name has changed through synonymy) by Sladen in 1919.

Bremus kincaidii (Cockerell) has never been authentically recorded from anywhere but St. Paul Island of the Pribilof Island Group. The occurrence of this species on Melville Island, if true, would be rather hard to explain in view of the accumulating evidence which seems to indicate that it is "endemic to the Pribilof Islands" (Frison, 1921, 1922, and 1923).

NOTE ON THE IDENTITY OF CONOPS BRACHYRHYNCHUS MACQ (DIPTERA).*

BY C. H. CURRAN,

Ottawa, Ont.

It is quite evident that this species has been wrongly identified in most collections owing to the fact that Williston erroneously placed his *C. obscuripennis* as a synonym of *brachyrhynchus*. In Williston's table of species (Trans. Con. Acad. Sci., vi, 390) *obscuripennis* goes into couplet 2 under the caption: "Third joint of the antennae distinctly shorter than the second." The description of *obscuripennis* Will. includes the following: "Antennae nearly black, first and third joint reddish below, of nearly equal length, scarcely more than half as long as second joint;—" Macquart's description include: "Antennarum secundo tertioque articulis aequae longis" and "Antennae peu divergentes; premier article testace; deuxième et troisième noirs, d'égale longueur." It is therefore quite obvious that there are actually two species and that the synonymy is quite erroneous. *C. brachyrhynchus* traces to *xanthopareus* Williston in the key (1c.) and specimens before me from Kansas and Iowa agree with the description. *Conops xanthopareus* Williston should therefore be placed as a synonym of *brachyrhynchus* Macq. while *obscuripennis* Williston is to be considered a valid species.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agriculture, Ottawa.

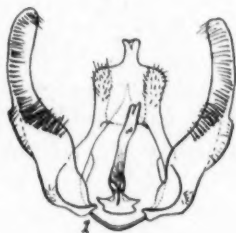
TWO NEW CANADIAN TORTRICIDS (LEPID.).*

BY J. MCDUNNOUGH,

Ottawa, Ont.

Argyroploce heinrichana n. sp.

Male. Intermediate in maculation between *glaciana* Moesch. and *bipartitana* Clem. Basal area dark black-brown, outwardly angulate in central portion of wing; antemedian whitish band broad on the costa, more or less perpendicular, with a few dark strigae; median dark band much as in *bipartitana*; whitish terminal area also much as in this species with three dark costal streaks and a small dark apical spot; slight dark reticulations below apex and a narrow dark patch at middle of outer margin (only evident on right side). Secondaries smoky. Expanse 18 mm.



Holotype.—♂, Hopedale, Labrador, July 19, (W. W. Perrett); No. 2377 in the Canadian National Collection, Ottawa.

The unique specimen is in poor condition and I should have considered it a worn specimen of either *glaciana* or *bipartitana* if it had not been for the very different genitalia (fig. 1) which I cannot match with any of the figures in Bull. U.S.N.M. 132, nor with my own slides. I take pleasure in naming it after Mr. C. Heinrich who has recently monographed the group.

Endothenia kingi n. sp.

Male. Has the general appearance of a dark suffused *montanana*, differs in the duller postmedian area of forewings, the much darker hindwings and the lack of a hair-pencil on the hind tibia. The antemedian pale band only faintly visible, being largely suffused with purplish-brown, as is the entire basal area; it is, however, indicated by oblique streaks on the costa and an indistinct semioval or lunate patch of dull ochreous scaling above the inner margin; median dark band entire in shape much as in *montanana*, being outwardly oblique from costa to cell, then inwardly oblique to a point above fold, where it broadens transversely, is again constricted and on the inner margin broadened to form a subtriangular blotch which is connected with a narrow upright tornal spot by the same dark shading found in the antemedian areas; beyond the median band on costa are six small dark spots bordered inwardly with light brown, the first two of these fused with the median band by dark shading, the outer three giving rise to oblique light brown lines which fuse and form a slight blotch immediately below the dark apex of wing and between which are traces of purplish shades; postmedian area

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

pale to smoky ochreous, somewhat glistening in the ocellar region, with a narrow curved dark subapical band and obscure dark terminal dots; fringes dark smoky with darker basal line. Hindwings unicolorous deep smoky with slightly paler fringes. Expanse 14-18 mm.

Holotype.—♂, Saskatoon, Sask., June 3, (K. M. King); No. 2412 in the Canadian National Collection, Ottawa.

Paratypes.—2♂, Saskatoon, Sask., June 16, July 8, (K. M. King); 1♂, Indian Head, Sask., June 28, (J. J. de Gryse).

Three species of this genus are listed by Heinrich as being without hair pencil on the hind tibia of the male, viz: *rubipunctana* Kft., *conditana* Wlsh. and *infusata* Heinr.; from the two latter *kingi* at once differs in the lack of a thin chitinous tongue at the apex of the aedocagus in the male genitalia, this organ being hatchet-shaped, much as in *montanana*; from *rubipunctana* it differs in the much broader uncus (similar to *montanana*) as well as in the lack of the pink shades in the maculation. It is possible that it is identical with the European *gentianana* Hbn. but as I have no material of this variable species for comparison I venture to describe the form as new and take pleasure in naming it after the collector, Mr. K. M. King, our indefatigable field-officer in Saskatchewan. There is considerable variation in the size of the specimens and also in the coloration of the postmedian area, the holotype being, in this respect, the palest specimen of my series.

NOTES ON THE DISTRIBUTION AND HOST PLANTS OF SOME NORTH AMERICAN MIRIDAE (HEMIPTERA).*

BY HARRY H. KNIGHT,

Ames, Iowa.

The following notes have accumulated while collecting and naming species of Miridae during the past ten years. The records are chiefly of species where the distribution is new or of special interest, or to give data on host relationships. I wish to take this occasion to acknowledge the assistance I have received from several botanists who have from time to time determined plants for me. To Dr. Philip A. Munz, of Pomona College, and Dr. K. M. Wiegand, of Cornell University, I am indebted for determining most of the plants from the southwestern United States, that I have recorded in connection with species collected during 1917. To Dr. A. J. Eames, of the Botany department of Cornell University, I am indebted for determining many New York plants I have recorded as hosts of Miridae from that state. I am also indebted to Dr. C. O. Rosendahl, of the Botany department of the University of Minnesota, for determinations of many plants collected in Minnesota during the years 1919 to 1924 inclusive. More recently, during 1925, I did some collecting in Colorado, and I wish to thank Miss Caroline M. Preston, of the Botany department of the Colorado Agricultural College, for the determination of a large number of plants from that state. The greater part of the host plants determined by these botanists have appeared as records in various papers I have published on Miridae during the past few years. The present

*—Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

paper contains data on various species for which it has not been convenient to publish heretofore.

Campylomma verbasici (Meyer). OREGON—♂ ♀ Aug. 1, 1926, Portland (A. A. Nichol), collected on *Verbascum thapsus* where it was evidently breeding.

Chlamydatus bakeri Bergroth. A large series taken on white sage (*Artemisia ludoviciana*) where the species was found breeding Aug. 5, 1922, North Branch, Aug. 13, 1922, Grand Marais, Aug. 2 to Sept. 3, 1923, Fort Snelling, near St. Paul, MINNESOTA—(H. H. Knight).

Atomoscelis modestus (Van. D.). Found breeding on *Iva xanthifolia* Nutt., Aug. 13, 1925, Mancos, COLORADO—(H. H. Knight). Taken at trap light July 12, 1917, Deming, NEW MEXICO—(H. H. Knight.) Collected on *Chenopodium* sp. July 22, 1917, Tucson, ARIZONA—(H. H. Knight). ♂ ♀ March 29 to June 7, 1924, Tucson; ♂ ♀ Aug. 29, 1924, Santa Rita Mts., Arizona (A. A. Nichol).

Plagiognathus caryae Knight. Breeding on pecan, April 26, Brownwood, 4 ♂ ♀ April 20, 1918, San Saba, TEXAS—(A. I. Fabis).

Plagiognathus guttatipes (Uhler). ALBERTA—July 3, 1926, Medicine Hat (F. S. Carr). COLORADO—♀ Aug. 4, 1925, Wray (H. H. Knight). MINNESOTA—♂ ♀ Aug. 1, 1923, Norman County (A. A. Nichol). NORTH DAKOTA—♂ ♀ July 19, 1920, Devil's Lake (T. H. Hubbell). ♂ ♀ July 19, 1923, Trail County (A. A. Nichol). SOUTH DAKOTA—♂ ♀ July 26, 1922, White; ♂ ♀ June 25, 1923, Rapid City (H. C. Severin). WYOMING—♀ July 20-25, 1920, Yellowstone National Park (A. A. Nichol). Originally described from Colorado as a *Lygus*.

Plagiognathus moerens Reuter. Found breeding on *Geranium* sp., Aug. 7, 1925, Stonewall, near Trinidad, COLORADO—(H. H. Knight). Aug. 9, 1925, Veta Pass, Colorado (H. H. Knight). ♂ ♀ Aug. 1, 1920, Missoula (A. A. Nichol). ♀ July 19, 1911, Gallatin County, WYOMING—♂ ♀ July 20-25, 1920, Yellowstone National Park (A. A. Nichol). WASHINGTON—♀ June 29, 1908, Pullman (W. M. Mann). BRITISH COLUMBIA—♂ June 18, 1917, Vernon (R. C. Treherne).

Plagiognathus repletus Knight. A large series taken June 9, 1925, Ames, IOWA (H. H. Knight), found breeding on black walnut (*Juglans nigra*).

Microsynamma bohemani (Fallen). COLORADO—12 ♂ ♀ Aug. 19, 1898, Dixon's Canyon, Fort Collins (E. D. Ball). ♀ Aug. 12, 1925, South Fork (H. H. Knight). OHIO—June 7, June 17, 1916, Columbus; June 20, 1915, Castalia (C. J. Drake). NEWFOUNDLAND—♂ ♀ Aug. 9, Spruce Brook (Chas. Schaffer). Breeds on *Salix*.

Psallus ancorifer (Fieber). I have seen specimens collected by Pergande, labeled "on clover" 1883, Washington, D. C. Clover is probably the chief host plant for the writer also found it most abundant on clover, June 24 to July 12, 1926, Washington, D. C.

Psallus alnicola (D. & S.). This species appears to be well distributed in North America, breeding on alder (*Alnus*), although rarely abundant. Records: BRITISH COLUMBIA—♂ Aug. 14, 1921, Barkerville (E. R. Buckell). COLORADO—♂ ♀ Aug. 20, 1899, North Park (E. D. Ball). ♂ ♀ Aug. 12, 1925, South Fork, ♂ ♀ Aug. 16, 1925, Placerville (H. H. Knight), on *Alnus*.

Psallus biguttulatus Uhler. TEXAS—♂ ♀ July 23, 1914, El Paso (J. C. Bradley). ♂ ♀ April 25, ♂ ♀ Mar. 23, 1925, Brownsville (T. C. Barber), breeding on

Malvaeviscus drummondii. NEW MEXICO—♂ ♀ July 12, 1917, Mesilla Park (H. H. Knight), at light. Described from Lower California and not recorded east of California.

Psallus seriatus (Reuter). Recent records: ARKANSAS—♂ ♀ Sept. 11, Yellville, taken at light; ♂ ♀ Sept. 10, 1926, Waldenburg (H. H. Knight). ALABAMA—♂ ♀ Sept. 5, 1926, Eufaula; ♂ ♀ Sept. 8, 1926, Clanton (H. H. Knight), at light. GEORGIA—♂ ♀ Sept. 4, 1926, Columbus (H. H. Knight), at light. MISSISSIPPI—♂ ♀ Sept. 10, New Albany (H. H. Knight), breeding abundantly on *Croton capitatus*.

Rhinacloa forticornis Reuter. ARIZONA—♂ ♀ July 18, Bonita; ♂ ♀ July 20, Texas Pass; ♂ ♀ July 21, 1917, Texas Pass to Tucson (H. H. Knight), found breeding on desert willow (*Covania mexicana*). ♂ ♀ Aug. 3, 1917, Grand Canyon (H. H. Knight). ♂ ♀ March 1 to July 12, Tucson, on *Acacia constricta paucispina*; July 15 to Sept. 10, Santa Catalina Mts.; June 22, 1925, Grand Canyon (A. A. Nichol). TEXAS—July 1, Helotes; July 2, Laguna; July 7, Valentine; July 9, Fabens (H. H. Knight). July 23, 1914, El Paso (J. C. Bradley). Dec. 4, Mission; Dec. 17, 1910, Brownsville (C. A. Hart). Aug. 29, 1919, Brownwood (W. A. Hoffman). MISSOURI—Sept. 5-10, 1925, Hollister (H. H. Knight). IOWA—Sept. 30, 1925, Ames (H. H. Knight). ILLINOIS—June 29, 1914, Urbana (C. A. Hart).

Leucopoeila albofasciata Reuter. ARIZONA—July 15, 1917, Bowie; July 16, 1917, Bonita (H. H. Knight), at light. April 5, April 12, 1924, Tucson; Sept. 30, 1925, Santa Rita Mts. (A. A. Nichol). Aug. 25, 1926, Kaibab Point (A. A. Nichol). NEW MEXICO—July 13, 1917, Lordsburg (H. H. Knight). MISSOURI—Aug. 21, 1916, Hollister (E. H. Gibson). Sept. 19, 1925, St. Louis (A. F. Satterthwait), found to be injurious to grasses on golf greens. OHIO—Oct. 20, 1921, Columbus (A. E. Miller). TENNESSEE—Sept. 13, 1917, Knoxville (W. B. Cartwright). ALABAMA—Sept. 5, 1926, Eufaula, at light; Clanton, Sept. 8, 1926 (H. H. Knight), at light. GEORGIA—Sept. 4, 1926, Columbus (H. H. Knight), at light. NORTH CAROLINA—Sept., Raleigh (F. Sherman).

Criocoris saliens (Reuter). MINNESOTA—June 23, July 1, 1920, St. Anthony Park (H. H. Knight). NEW YORK—Aug. 2, 1915, Batavia (H. H. Knight). July 16, 1917, Cranberry Lake (C. J. Drake). PENNSYLVANIA—June 2 to June 16, Marion; June 9, N. Cumberland; June 25, Hummelston (J. R. Stear). MARYLAND—May 18, 1913, Plummers Island (W. L. McAtee). 3 ♂ ♀ June 20, 1926, Thurmont (H. H. Knight). VIRGINIA—4 ♂ ♀ May 30, 1917, Dumfries (H. H. Knight). KANSAS—Topeka (Popenoe). CALIFORNIA—Los Angeles County (Coquillett).

Reuteroscopus sulphureus (Reuter). Found breeding on *Sida spinosa* L., Sept. 3, Stone Mountain; Sept. 4, 1926, Columbus, GEORGIA (H. H. Knight). ALABAMA—Sept. 6, 1926, Eufaula (H. H. Knight). MISSISSIPPI—♀ "Miss." ARKANSAS—♂ ♀ Sept. 10, 1926, Newark and Waldenburg (H. H. Knight). ARIZONA—♂ ♀ July 22, 1917, Tucson (H. H. Knight). ♂ ♀ Sept. 25, 1924, Santa Catalina Mts. (A. A. Nichol).

Dicyphus minimus Uhler. A large series taken when the species was found breeding on *Nicotiana trigonophylla* Duval, July 18, 1917, Bonita, ARIZONA (H. H.

Knight). A species of Neididae, *Pronotacantha annulata* Uhler, was also found abundant on the same host plant.

Dicyphus discrepans Knight. ♂ ♀ Dec. 9, 1914, Oyster Bay, WASHINGTON (W. L. McAtee), collected in hibernation under leaves.

Dicyphus vestitus Uhler. Taken in April (H. M. Harris), and October (H. G. Johnston) at Ames, IOWA, which indicates that this species also hibernates as an adult.

Halticotoma valida Reuter. ARIZONA—Texas Pass to Tucson, July 21, 1917 (H. H. Knight), found breeding on Yucca. COLORADO—♂ ♀ June 17, 1900, Lamar (E. D. Ball). TEXAS—April, 1910, Sabinal (F. C. Pratt). MISSISSIPPI—Vicksburg (T. H. Allein), reported "abundant on Spanish dagger plants." July 1, 1921, Tupelo (C. J. Drake). July 16, 1924, West Point (M. R. Smith). TENNESSEE—July 25, 1912, Knoxville (G. G. Ainslie). Aug. 9, 1916, Sweetwater (W. S. Adkins). FLORIDA—Gainsville, "on Spanish bayonet" (Agr. Expt. Sta.). SOUTH CAROLINA—Clemson College (E. F. Conrady and W. A. Thomas).

Pycnoderes quadrimaculatus (Guerin). A large series collected Oct. 25, 1922, Phoenix, ARIZONA (H. Sakamoto), were received with the statement that these insects were doing considerable damage to beans. I have seen other specimens taken at Phoenix on squash and cucumber. This species has been reported as a pest in Arizona and Mexico by Morrill (1926).

Fulvius imbecilus (Say.). FLORIDA—Aug. 4, 1918, Gainsville (C. J. Drake). VIRGINIA—Aug. 15, Falls Church (N. Banks). ALABAMA—Sept. 8, 1926, Clanton (H. H. Knight). taken at light. TENNESSEE—Clarksville, 1915 (G. G. Ainslie). ILLINOIS—Aug. 27, 1908, Beverley Hills (W. J. Gerhard).

Clivinema regalis Knight. ♂ Sept. 4, 1925, Santa Rita Mts., ARIZONA (A. A. Nichol). This is the first specimen seen since the species was described from material collected at Al Paso, Texas, by Dr. J. C. Bradley.

Deraeocoris (C.) *histrion* (Reuter). This species was found breeding on *Polygonum muhlenbergii*, near Jordan, MINNESOTA, July 13, 1923 (H. H. Knight). It was also taken on *Polygonum*, Aug. 4, 1925, Wray, COLORADO (H. H. Knight).

Deraeocoris (C.) *bakeri* Knight. A good series collected on rabbit bush (*Chrysothamnus*), Sept. 27, 1921, near Woodside, UTAH (Grace O. Wiley), ARIZONA—June 22, 1925, Grand Canyon; June 24, 1925, Williams (A. A. Nichol).

Deraeocoris (C.) *migrifrons* Knight. COLORADO—♂ ♀ Aug. 17, 1925, Gunnison (H. H. Knight), collected on rabbit bush (*Chrysothamnus* sp.). ♂ Aug. 24, 1925, Estes Park (H. H. Knight). ♂ 2 ♀ Aug. 25, 1926, North Park (B. B. Fulton).

Deraeocoris incertus picipes Knight. A good series found breeding on Spruce (*Picea* sp.), Aug. 8, 1925, Stonewall, near Trinidad, COLORADO—♂ Aug. 14, 1918, Headland, Lake County (E. R. Kalmbach).

Deraeocoris barberi Knight. A good series taken when the species was found breeding on *Pinus ponderosa*, Aug. 7, 1925, Stonewall, near Trinidad; Aug. 22, Pingree Park; Aug. 23, Rist Canyon, near Ft. Collins; Aug. 24, 1925, Estes Park COLORADO (H. H. Knight).

Deraeocoris fulvescens Reuter. A good series found breeding on *Pinus ponderosa*, Aug. 7, Stonewall, near Trinidad; Aug. 22, Pingree Park; Aug. 24, 1925, Estes Park, COLORADO (H. H. Knight).

Eustictus mundus (Uhler). ♀ Sept. 6, 1926, Eufaula, ALABAMA (H. H. Knight).

This specimen was found hiding under a piece of dead bark which was pulled from the injured trunk of a pecan tree. When disturbed it did not take flight, but ran around the tree trunk and was captured only by a lucky stroke with the killing bottle. Evidently the majority of species in this genus are nocturnal in habits, hiding away during the day time so that few are captured except at lights.

Eustictus salicicola Knight. ♀ July 19, 1915, Mouth Bear River, UTAH (A. Wetmore).

Halticus intermedius Uhler. Breeding on *Clematis virginiana*, July and Aug., 1915, Batavia, NEW YORK (H. H. Knight). This species has developed into a pest on ornamental *Clematis* in Mississippi. Prof. R. N. Lobdell found it injurious at Starkville, MISSISSIPPI, June 20, 1923; also observed at the same locality July 7, 1924, by Mr. M. R. Smith. The writer found *intermedius* Uhler breeding on *Clematis ligusticifolia* Nutt., near Trinidad, COLORADO, Aug. 7, 1925.

Lopidella flavoscuta Knight. Mr. A. A. Nichol found this species breeding on *Heliochloa monogyna*, Sept. 7, 1925, alt. 3500 ft., Rincon Mts., ARIZONA.

Lopidea amorphae Knight. ♂ ♀ July 12, 1922, Lake Hendricks, SOUTH DAKOTA (H. C. Severin). ♀ Aug. 3, 1925, Palisade, NEBRASKA (H. H. Knight).

Lopidea chelifer Knight. ♂ ♀ Aug. 7, Stonewall, near Trinidad; Aug. 9, Veta Pass; Aug. 12, 1925, Pagosa Springs, COLORADO (H. H. Knight), found breeding on *Robinia neomexicana*. It is interesting to note that *Lopidea arizonae* Knight and *L. navajos* Knight were not found here although these species breed on the same host plant in Arizona. The female of *chelifer* is conspicuously marked with white along claval suture, embolium, and cuneus.

Lopidea davisi Knight. This is the phlox plant bug, which has proved to be a pest on cultivated phlox since its description in 1917. WEST VIRGINIA—♂ ♀ June 26, 1920, Charles Town (L. C. Ambler), where it was reported as a pest on phlox. MINNESOTA—♂ ♀ June 20, 1923, Faribault, (A. T. Hertig), where it was a pest on phlox. SOUTH DAKOTA—♂ ♀ Aug. 2, 1923, Sioux Falls (H. C. Severin). TENNESSEE—June 29, 1926, Nashville (C. W. Witherspoon), injurious to phlox. No doubt this is the same species that has been reported as injurious to phlox under the name of *Lopidea media* (Say).

Lopidea falcicula Knight. COLORADO—♂ ♀ Aug. 7, Stonewall, near Trinidad; Aug. 11, Fort Garland; Aug. 13, Mancos; Aug. 12, Pagosa Springs; Aug. 12, 1925, Wolf Creek Pass (H. H. Knight); found breeding on *Astragalus* sp.

Lopidea incurva Knight. This species breeds on honey locust (*Gleditsia triacanthos* L.) where I have found it abundant, July 1 to July 9, 1925, Ames, IOWA. Also found it breeding on the same host, July 8 to July 19, 1926, Washington, DISTRICT OF COLUMBIA. Other records: NEBRASKA—July 20, 1916, Falls City (H. G. Barber). KANSAS—July 28, Topeka (Popenoe). ILLINOIS—Aug. 27, 1910, Kankakee (A. B. Wolcott).

- Lopidea instabilis* (Reut.). Found breeding on a golden rod (*Solidago* sp.) July 12 to Aug. 26, 1926, Washington, DISTRICT OF COLUMBIA (H. H. Knight). This golden rod was the most abundant species found growing on high and rather dry clay soil.
- Lopidea minor* Knight. This species breeds on prairie clover (*Petalostemum purpureum*) where nymphs and adults were found June 18 and June 20, 1925, Ames, IOWA (H. H. Knight). Mr. G. H. Hendrickson has also found this species breeding on the same plant near Ames. The writer has previously recorded this species from Colorado, North Dakota, and Alberta, Canada. The most surprising distribution was in finding *minor* at Ithaca, NEW YORK, June 18, 1921 (J. L. Buys). It will be of considerable interest if collectors can find the host plant at Ithaca. The species has also been taken July 20, 1914, El Paso, TEXAS (J. C. Bradley).
- Lopidea salicis* Knight. This species has usually been found breeding on willow, particularly *Salix nigra*, but I found it on *Ulmus*, 3 ♀ July 10, 1924, Ramsey Co., MINNESOTA. One specimen was teneral and still unable to fly which indicates that it developed on the elm. It also bred on willow in the same locality where I took several specimens. More recently I have again found *salicis* breeding on elm (*Ulmus*), ♂ ♀ June 9, 1925, Ames, IOWA.
- Lopidea sayi* Knight. 3 ♂ ♀ July 20, Plummerville Island, MARYLAND (H. H. Knight), all taken on hornbeam (*Ostrya virginiana*). While this is not definite proof that the species was breeding there, it is a good indication that hornbeam may prove to be the host of this rather scarce species. At present the species is known only from Plummerville Island and South Carolina.
- Lopidea staphyleae sanguinea* Knight. Found breeding abundantly on bladder nut (*Staphylea trifolia* L.), growing on Manitou Island, White Bear, MINNESOTA (H. H. Knight). Not a single specimen of the typical form was taken, indicating that the conditions (probably high temperature) were not favorable for producing the light colored form. Typical *staphyleae* has been taken in Montgomery County, KANSAS (R. H. Beamer).
- Lopidea teton* Knight. Found breeding on ground plum (*Astragalus caryocarpus* Ker.), June 18, 1925, and June 4, 1926, Ames, IOWA (H. H. Knight). Mr. G. H. Hendrickson has also found *teton* to breed on the same host. The host plant was not known at the time of describing the species (1923), although the localities indicated it to be a prairie type, hence the name meaning "dweller of the prairies" was used. With more knowledge of the species this name proves to be a very appropriate one.
- Lopidea ute* Knight. Collected on squaw berry (*Shepherdia argentea* Nutt.) which very likely is the host plant of the bug, Aug. 12, 1925, Mancos, COLORADO (H. H. Knight).
- Orthotylus althaeae* Hussey. Found breeding on hollyhock, July 2, 1920, Chatfield, MINNESOTA (P. L. Keene). Breeding abundantly on an ornamental (*Althaea* sp.) during September, 1925, Ames, IOWA (H. H. Knight). Collected under wild conditions Aug. 11, 1925, Ute Creek Ranch, Fort Garland, COLORADO (H. H. Knight).

- Orthotylus coagulatus* Uhler. Found breeding on *Chenopodium album*, Aug. 7, Stonewall, near Trinidad; Aug. 24, 1925, Estes Park, COLORADO (H. H. Knight). *Orthotylus flavosparsus* Sahlbg. was not found here, although it breeds abundantly on this plant in the eastern United States.
- Orthotylus angulatus* (Uhler). Found breeding on *Populus latifolia*, Aug. 7, Stonewall, near Trinidad; Aug. 11, Ute Creek Ranch, Fort Garland; Aug. 15, 1925, Dolores, COLORADO (H. H. Knight). Specimens are also at hand, Aug. 19, 1898, Dixon's Canyon, Fort Collins, Colorado (E. D. Ball).
- Blepharidopterus angulatus* (Fallen). The writer first recognized this Palaearctic species in North America from Nova Scotia (Can. Ent., liii, p. 285 (1922). I have recently examined specimens, ♂ ♀ Aug. 14, 1924, North Westminster, BRITISH COLUMBIA (W. Downes) which indicates that the species must be holarctic in distribution.
- Cyrtorhinus vagus* Knight. July 22, 1925, Rainey Refuge, Vermillion County, LOUISIANA (C. C. Sperry), at light.
- Heterocordylus malinus* Reuter. This species has a much wider distribution than the destructive apple red bug (*Lygidea mendax* Reut.). I have determined the following: MINNESOTA—♂ ♀ June 12, 1922, Faribault (H. H. Knight). IOWA—♂ ♀ May 22 to June 10, 1925, Ames (H. H. Knight). MISSOURI—♂ ♀, Columbia (?C. V. Riley). LOUISIANA—March 28, 1907, Natchitochs and Shreveport (Cushman & Pierce), on *Crataegus*. ILLINOIS—"N. III." (Uhler collection). June 19, 1904, Glen Ellyn (W. J. Gerhard). TEXAS—March 27, 1907, Wolf City (F. C. Bishop), on *Crataegus*. PENNSYLVANIA—June 9, 1915, Clearfield (Cushman). WEST VIRGINIA—Aug. 10, 1904, "W. Va." (O. Heidemann).
- Globiceps dispar* (Boheman). ♀ (brachyp.) 2♂ (macrop.) Aug. 22, 1925, Pingree Park, COLORADO (H. H. Knight), collected by sweeping a mixture of sedges and grasses.
- Alepidiella heidemanni* Poppius. Found breeding on *Pinus virginiana* Aug. 17, 1926, Glen Echo, MARYLAND (H. H. Knight).
- Pilophorus laetus* Van Duzee. ♀ Sept. 5, 1926, ALABAMA (H. H. Knight), at light.
- Pilophorus walshii* Uhler. Found breeding on honey locust (*Gleditsia triacanthos*) July 8, July 12, 1926, Washington, DISTRICT OF COLUMBIA (H. H. Knight), but rather scarce.
- Sericophanes triangularis* Knight. ♂ ♀ June 23, 1923, Philip, SOUTH DAKOTA (H. C. Severin). ♂ July 13, 1909, Denver, COLORADO (W. J. Gerhard). Described from New Mexico and Arizona (1918), the present records indicate that the species has a northward distribution in the great plains region. The female has short wings with membrane absent, yet retaining the characteristic white markings of the male; pronotum more quadrate and scutellum more convex than in the male. In fact the differences between the sexes in this species are as great as the differences drawn to separate the genus *Sericophanes* from *Cyrtopeltocoris*. Among the mimetic genera of Miridae, the modifications of the thorax differ so greatly between the sexes of certain species, we will some day need to revise the genera on other characters.

Cyrtopeltocoris albo-fasciatus Reuter.

Sericophanes transversus Knight, Bul. Brook. Ent. Soc., xiii, 1918, p. 82.

♂ Sept. 5, 1926, Eufaula, ALABAMA (H. H. Knight), taken at light. This appears to be the first record for *albo-fasciatus* occurring east of Texas. The writer described this species as a *Sericophanes*, not realizing that the genus *Cyrtopeltocoris* Reut. is so closely allied. Possibly this genus may stand on the basis of the convex scutellum, yet *Sericophanes triangularis* Kngt. is in this respect just half way between the two genotypes.

Mimoeops insignis Uhler. I am unable to separate *gracilis* Uhl. from this species except on the basis of the color on the hemelytra. In *insignis* the black color extends along the commissure to the scutellum, leaving a pale spot on base of each wing. In a large series collected by Mr. Torre-Bueno, June 14, 1924, Armonk, and June 28, 1924, White Plains, NEW YORK, all variations in form of the thorax exist, the longer winged individuals having pronotum broad at base (*insignis*), while the short winged forms have base of pronotum narrower (*gracilis*). In well marked color forms from Colorado and Utah I find no structural difference in genitalia or other characters which will distinguish them from New York specimens having equally developed hemelytra. I took 3 ♂ 4 ♀ Aug. 12, 1925, South Fork, COLORADO, which I place as variety *gracilis* Uhler, a paler form of the species which occurs chiefly in the western states.

Pithanus maerkelii (H. S.). A good series taken July 2, 1926, San Juan Island, WASHINGTON (C. J. Drake).

Trigonotylus confusus Reuter. Found breeding on *Spartina patens*, June 27, 1926, North Beach, MARYLAND (H. H. Knight), around the edges of overflow salt marsh meadows.

Megaloceroea recticornis (Geoff. in Fourc.). Found breeding on Panic grass (*Panicum* sp.), June 17, June 20, 1925, Ames, IOWA (H. H. Knight). This Palearctic species was first recognized (Knight, 1919) in North America from specimens collected at Madison, Wisconsin (S. B. Fracker), and labeled "swept from foxtail grass." I have repeatedly swept foxtail grasses in Minnesota and Iowa without success in collecting this species. Additional records: WISCONSIN—♂ July 1, 1909, Dane County (W. S. Marshall). ONTARIO—♀ June 30, 1919, Burlington (H. G. Crawford). BRITISH COLUMBIA—♂ ♀ Aug. 4, 1921, Duncan (W. Downes). 2 ♀ July 4, 1926, Victoria (C. J. Drake).

Collaria oculata Reuter. Found breeding on *Panicum huachucae silvicola* (H. & C.), July 7, 1926, Vienna, VIRGINIA (H. H. Knight).

Mesomiris curtulus Reuter. Found breeding on *Panicum virgatum*, Aug. 4, 1925, Wray, COLORADO (H. H. Knight).

Platytyellus atripennis Reuter. ARIZONA—♀ Sept. 13, 1925, Oracle, alt. 4000 ft. (A. A. Nichol). FLORIDA—♀, "Fla." TENNESSEE—2 ♀ July 4, 1916, Coal Creek (W. S. Adkins). Previously recorded only from Texas and Colorado.

Platytyellus circumcinctus (Say). 2 ♂ "E. Fla.," FLORIDA (Ashmead). Previously known only as far south as North Carolina.

Opistheuria clandestina dorsalis Knight. Found to be injurious to pale and lima beans, 24 ♂ ♀ July 26, Sept. 16, 1921, Baton Rouge, LOUISIANA (W. G. Bradley). All the specimens examined are of *dorsalis* Kngt. which suggests that there may be some biological difference in the forms of this species.

- Opistheuria clandestina ventralis* Knight. MINNESOTA—June 25 to July 12, 1921, Lake Itasca, (H. L. Person). NORTH DAKOTA—♂ ♀ July 19, 1923, Trail County (A. A. Nichol). So far this form has been found only in the northern states.
- Tropidosteptes cardinalis* Uhler. ♀ March 31, Victoria, TEXAS (Barber & Schwarz). This record is rather surprising for a bug known to breed only on white ash (*Fraxinus americana*) in the northeastern states. However, this species passes the winter in the egg stage on twigs of the host, a condition that permits transportation wherever the host tree is shipped and planted as an ornamental.
- Neoborella tumida* Knight. The type series of specimens was collected on mistletoe (*Arceuthobium*) growing on pines at the top of Mt. Lemon, Arizona. Several more specimens were taken Aug. 24, 1925, Estes Park, COLORADO (H. H. Knight), on *Arceuthobium cryptopodium* Engelm. which mistletoe was found growing on *Pinus scopulorum*.
- Lygidea mendax* Reuter. The destructive apple red bug was collected May 30, 1918, Bentonsport, IOWA (E. V. Walter). This marks the point furthest west in the known distribution of this species.
- Lygus pratensis* (Linn.) typical. ALBERTA—July 27, 1920, Armena (C. E. Hendrickson). ♂ ♀ Feb. 27, May 22, 1926, Medicine Hat (F. S. Carr). MANITOBA—♂ ♀ Aug. 21, 1920, Aweme (N. Criddle). Cowley (R. N. Chrystal). MINNESOTA—July 25, Aug. 7, 1924, St. Anthony Park; Sept. 11, 1923, Minnetonka Lake (H. H. Knight). ♂ ♀ June 16, 1920; Norman County (A. A. Nichol). NORTH DAKOTA—♂ ♀ June 25, 1922, Fargo (R. L. Webster). SOUTH DAKOTA—June 25, Rapid City, June 26, 1923, Whitewood (H. C. Severin). MONTANA—June 17, 1921, Gallatin County (W. C. Cook). UTAH—♂ ♀ Aug. 14, 1921, Emery County, (Grace O. Wiley). Sept. 30, Bear River, Oct. 4, 1914, Ogden (A. Wetmore). Sept. 12, Brigham, Aug. 24, 1925, Smithfield (G. F. Knowlton). WASHINGTON—July 2, 1926, San Juan Island (C. J. Drake). BRITISH COLUMBIA—May 21, 1919, Lytton (W. B. Anderson). The typical variety has not before been recorded from North America. I have specimens of the typical variety from England and Germany from which I am unable to separate the specimens recorded above.
- Lygus punctatus* (Zett.). ♂ Aug. 20, 1925, Pingree Park, COLORADO (H. H. Knight). 2 ♂ Sept. 13, 1912, Victoria, BRITISH COLUMBIA (W. Downes), "collected on pigweed." These specimens have been compared and found identical with examples from Finland, determined and received from Bergroth. The genital claspers as well as other characters indicate that we are dealing with a good species.
- Lygus nigropallidus* Knight. Found breeding on *Lupinus argenteus* var. *argophyllus* Wats., Aug. 11, 1925, Ute Creek, Fort Garland; and Aug. 20, 1925, Pingree Park, COLORADO (H. H. Knight).
- Lygus nubilatus* Knight. Collected on *Holodiscus discolor*, Aug. 1, 1926, Portland, OREGON (A. A. Nichol).
- Lygus distinguendus* Reuter. Collected on *Salix glaucops*, Aug. 22, 1925, Pingree Park, COLORADO (H. H. Knight).
- Lygus rubicundus winnipegensis* Knight. COLORADO—♂ Aug. 19, 1898, Dixon's

- Canyon, Ft. Collins (E. D. Ball). MICHIGAN—♂ Aug. 30, 1888, Marquette. ONTARIO—♂ ♀ May 5, 1912, Ottawa (W. Metcalfe). ♂ May 22, 1913, Ottawa (Beaulieu).
- Lygus sallei* Stal. A good series taken July 26, 1917, Mt. Lemon, ARIZONA (H. H. Knight), on *Scrophularia leporella*. COLORADO—Aug. 7, Stonewall, near Trinidad; Aug. 9, Veta Pass; Aug. 16, 1925, Placerville (H. H. Knight).
- Lygus cristatus* Distant. TEXAS—Aug. 1, 23, 1906, Brownsville (A. B. Wolcott). Nov. 21, 1910, Brownsville (C. A. Hart). Brazos County (N. Banks). This species was originally described from Mexico and not before reported from the United States.
- Neolygus deracocorides* Knight. ARIZONA—June 19, Prescott; June 13, Williams (Barber & Schwarz).
- Neolygus communis* Knight. ALBERTA—Aug. 1, 1920, Banff (C. E. Hendrickson). COLORADO—Aug. 11, 1925, Ute Creek, Fort Garland; Aug. 12, 1925, South Fork (H. H. Knight). MONTANA—Aug. 14, 1926, Park County, alt. 6000 ft. (A. A. Nichol). CALIFORNIA—July 1917, Yosemite (W. M. Giffard). Apparently only a few species of *Neolygus* occur in the western states, but this, the pear plant bug, occurs in the mountainous regions of the west, apparently in canyons and protected places where the humidity is never extremely low during the growing season.
- Neolygus semicittatus* Knight. April 2, April 26, 1907, Dallas; April 11, 1907, Kerrville, TEXAS (F. C. Pratt).
- Horcias fallax* Reuter. A good series of nymphs and adults taken on wild gooseberry (*Ribes oxycanthoides* L.) the host plant, May 18 to May 25, 1925, Ames, IOWA (H. H. Knight).
- Horcias sexmaculatus* Barber. A large series of nymphs and adults taken June 27, 1917, New Braunfels, TEXAS (H. H. Knight), where the species was found breeding on *Rudbeckia columnaris* along the Comal river.
- Calocoris fulvomaculatus* (De Geer). Uhler listed this species in his check list (1888) without giving data on the specimen. I have found in Uhler's collection (U.S.N.M.) a female specimen labeled "Mackenz. Kenn.," no doubt meaning Mackenzie river, Robert Kennicott collector. This is most likely the specimen on which the original record was based. I have previously recorded the species from Alaska (1921) and now add the following record: ♂ ♀ July 9, 1921, ALASKA, Camp 334, Alaskan Eng. Comm. (U.S.N.M.).
- Calocoris fasciiventris* Stal. Found breeding on *Cosmos* sp., Sept. 24-26, 1925, Santa Rita Mts., ARIZONA (A. A. Nichol). I have previously recorded this species as a *Horcias*, but now believe it goes best in the genus *Calocoris* where Stal described it, after consideration of the antennal and pubescence characters.
- Creontiades debilis* Van Duzee. A series of specimens taken on *Daubentonia longifolia*, June 14, 1917, Biloxi, MISSISSIPPI (H. H. Knight). Specimens are also at hand taken Sept. 1-10, 1925, Port Lavaca, TEXAS (R. H. Painter), on *Atriplex matamorensis*.
- Allorhinocoris flavus* J. Sahlbg. ♀ June 1, 1911, Siskiyou County, CALIFORNIA (F. W. Nunenmacher). Previously recorded only from Oregon (Van Duzee, 1917).

- Ganocapsus filiformis* Van Duzee. Mr. A. A. Nichol found this species breeding on *Amaranthus palmeri*, Aug. 29, 1925, Tucson, and Sept. 7, 1925, Rincon Mts., ARIZONA.
- Phytocoris antennalis* Reuter. IOWA—♂ Aug. 17, 1893, Ames (E. D. Ball). INDIANA—2 ♀ "Ind." (C. F. Baker).
- Phytocoris brevisculus* Reuter. ALABAMA—♂ Sept. 5, ♀ Sept. 6, 1926, Eufaula (H. H. Knight). DISTRICT OF COLUMBIA—♀ July 2, ♀ July 9, 1926, Washington (H. H. Knight), taken at light. These specimens are the first I have seen from east of Texas, although the species is listed in Smith's list of insects of New Jersey (1910). The species is apparently nocturnal since the present specimens as well as a good series taken in Texas during 1917, were all collected at light. Only two specimens were taken on mesquite during several days of sweeping and beating.
- Phytocoris formosus* Van Duzee. A large series of nymphs and adults were taken Aug. 15, 1917, by Torrey's Pines near San Diego, CALIFORNIA, on the host plant, *Adenostegia filifolia*. Van Duzee (1925) records this species on *Cordylanthus*.
- Phytocoris interspersus* Uhler. A good series taken July 26, 1917, Mt. Lemon, Santa Catalina Mts., ARIZONA (H. H. Knight), on one of the white oaks (*Quercus* sp.). Also taken on oak (*Quercus* sp.) Aug 7, 1925, Stonewall, near Trinidad, and Aug. 11, 1925, Fort Garland, COLORADO (H. H. Knight).
- Phytocoris laevis* (Uhler). Nymphs were taken on rabbit bush (*Chrysothamnus* sp.) Aug. 14, 1925, Mesa Verde National Park (H. H. Knight).
- Phytocoris luteolus* Knight. LOUISIANA—♀ June 16, 1924, Tallulah (E. R. Kalmbach).
- Phytocoris rufus* Van Duzee. LOUISIANA—♂ June 16, 1917, Colyell (H. H. Knight). MISSISSIPPI—♀ July 13, 1920, Big Point (H. L. Dozier).

A BAETINE MAYFLY NYMPH WITH TUSKED MANDIBLES

BY JAMES G. NEEDHAM,

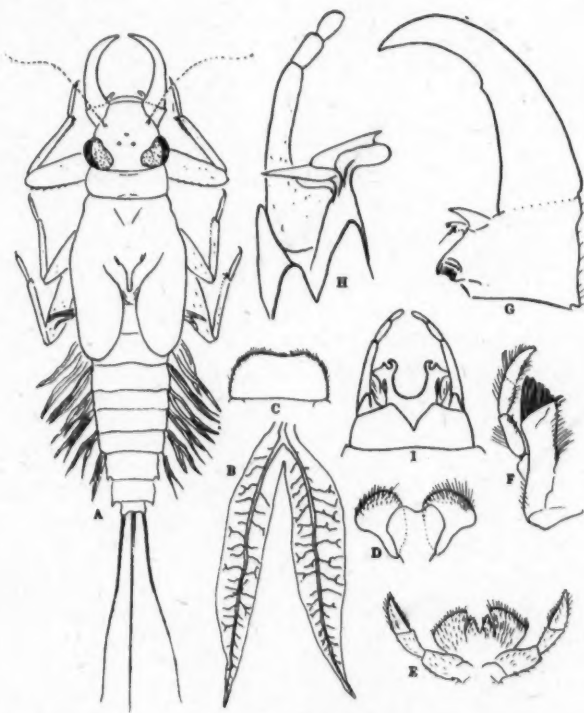
Cornell Univ., Ithaca, N.Y.

This paper is to record the discovery of a mayfly nymph of very surprising form. It comes from the Ogden River in Utah. I collected it along with other aqatics on a hasty trip to that river, just before leaving Utah in July, 1926.

After returning home, on looking over the material collected I found one broken specimen. It had huge mandibular tusks, such as have hitherto been supposed to be the exclusive mark of nymphs of the Ephemerinae, but combined with a body like that of the Baetinae. It was a genuine puzzle.

Dr. H. J. Pack was with me when this unique specimen was collected and knew the exact spot in the north fork of Ogden River whence it had come; so, I sent a drawing of it to him at Logan and suggested the desirability of obtaining more and better specimens. He at once went after them, making a special trip from Logan for the purpose. He succeeded in getting several dozen grown nymphs; and not only that, but on taking them back to Logan alive, reared a number of specimens of both sexes. To Dr. Pack therefore is wholly due our knowledge of its life history and our positive assurance as to its systematic position.

When his reared specimens reached me an examination of the adult revealed to my astonished eyes a *Leptophlebia*! That a nymph with such huge mandibular tusks could be congeneric with ordinary *Leptophlebia* nymphs that have no tusks at all, seemed hardly believable. Yet the adult seemed not to be generically distinguishable. It is merely another remarkable illustration of the phenomenon, already well known in Ephemeroidea, of specialisation in nymphs independently of the adult. The brief life of the imago is free from the business of getting a living; the struggle for existence falls mainly on the nymphs, and so it is the immature stages that show differentiation.



Leptophlebia packii n. sp. A., nymph; B, gill-lamellae; C-F, mouth-parts of nymph; G, mandible with tusk; H, I, adult male genitalia.

Both stages may be described as follows:

***Leptophlebia packii* n. sp.**

Adult. Length, male and female, 8 mm., with tails 11 mm. additional. Fore leg of male 12 mm.; of female 7.5 mm.

As in size, so in coloration the sexes are similar. Both are blackish and nearly concolorous of body, with brownish appendages. Head, dull black. Thorax black, shining and polished above and below, becoming brownish and duller about the bases of the legs and wings. Legs brown with the knee joint blackish. Wings hyaline with brown veins, and very pale cross veins. There is a deeper tinge of brown at the very base, extending as far out as the humeral crossvein.

Abdomen dull blackish brown, not translucent in the male on the middle segments in this species, only a little lighter in color on the basal half of these segments. Tails brown at base rapidly becoming paler as they taper to very slender inconspicuous tips. Male genitalia as shown in figures H and I, with a large basal swelling on the first joint of the forceps, the notched tips of the penes separated by a broadly U-shaped interval, the recurved process lance-triangular, tapering to a thin flat point. The 9th sternite of the female is produced posteriorly in a pair of triangular lobes that extend beyond the apex of the annular 10th segment more than the length of that segment.

The subimago is similar, but duller in color and more greyish.

The nymph measures in length 9 mm., with tusks 1.5 mm. and tails 9 mm. additional.

Body elongate, with rather high thorax and depressed abdomen. Color greenish brown, paler beneath, with diffuse sooty-black patches segmentally arranged along the sides of the abdomen above. These patches are repeated beneath on segments 8 and 9.

Head wider than long, with vertical face, antennae pale beyond the two brown-ringed basal segments. Labrum blackish. The huge tusks on the mandibles are ivory yellow beyond their basal constriction, and are bent forward there at an angle with the plane of the face. They are flat and smooth and incurved, with sometimes a suggestion of a denticle near the middle of the concave inner margin. The other mouthparts are as shown in figures C, D, E and F.

The legs are long and slender, very sparsely clad with thin hairs. The fore legs are longest; and at the inner apical angle of the front tibia there is no "thumb" process, but only a denser fringe of short scurfy hairs. Color of all legs pale with three darker bands, one at the knee, one near the middle of the tibia, and one on the base of the tarsus; claws almost smooth, with only very faint denticulations basally beneath.

The gills are similar on abdominal segments 1 to 7, larger on the middle segments. Each gill is divided almost to the base in two long, lanceolate, acuminate lobes, in each of which there is a coarse central trachea which bears short pinnately arranged branchlets. There are short, sharp lateral spines on abdominal segments 8 and 9, pointing a little outward, but with their sharp tips bent parallel. Tails long tapering, very close-ringed especially at the base but the joinings are not marked with color, and the whorls of fine setae about them are very inconspicuous.

The venation of the wings is very similar to that of the more typical species of *Leptophlebia*. Vein Cu_2 appears to be detached, owing to the fading out of its basal portion. The posterior fork of the median vein appears more nearly symmetrical (less skewed posteriorly) than in the typical species. The slant crossveins of the stigmatic area are very inconstant, being simple, forked, or anastomosing, and traversing one or two rows of cells.

Dr. Pack writes me that he secured the nymphs of this species in the shallow water along the edge of the stream. This was in the north or left fork of Ogden River where crossed by the highway near its junction with the main stream. Within two or three days after he took them alive to Logan, they began

to emerge. They did not shed the subimaginal skin until forty eight hours or more after emergence. About a dozen specimens were reared, and among them two males attained fully adult coloration.

The type is in the Cornell University collection and paratypes are there also, and in the Utah Agricultural College collection, in the Canadian National collection at Ottawa, and in the U. S. National Museum.

MOSQUITOES FROM BAFFIN LAND

BY C. R. TWINN,

Entomological Branch, Ottawa.

A collection of mosquitoes taken in Baffin Land, in 1925, by Mr. J. Dewey Soper, of the Department of Mines, has been received, recently, from Dr. R. M. Anderson of the Victoria Memorial Museum, Ottawa. The collection consists of eighty-four adults, two of which are males and the remainder females, and ten larvae. These specimens are of particular interest in that they are the first to be received from this island, and add to our rather scanty knowledge of the mosquito fauna of northern Canada. The collections were made on the east side of Nettilling Lake, the larvae being taken on June 28, and the adults on June 30 and July 9, 17 and 22.

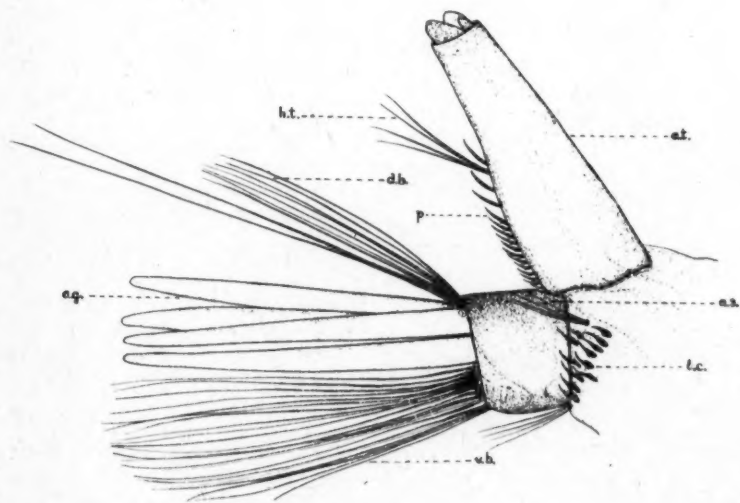


Fig. 1.—Terminal abdominal segments of larva of *Aedes alpinus* L., much enlarged; a. g., anal gills; a. s., anal segment; a. t., air tube; d. b., dorsal brush; h. t. hair tuft; l. c., lateral comb; p. pecten; v. b., ventral brush.

During his sojourn in Baffin Land, Mr. Soper states that mosquitoes were not very troublesome, and it was never necessary to wear a veil as a protection against their bites. He found larvae common in shallow pools in the latter part of June, the adults making their appearance at the end of June, and becoming most numerous in late July and early August, apparently reaching the peak of their abundance on August 7.

The larvae belong to the species *Aedes alpinus* L., (Fig. 1) which has a wide distribution in northern latitudes. The larvae of this species have been described under the name of *Ochlerotatus nigripes* Zetterstedt by Wesenbourg-Lund (4) and as *Aedes* n. sp. by Dyar (1), but as the specimens before me show certain minor differences, I append the following brief description:

Head rounded, wider than long; antenna moderate, slender; antennal tuft of few short, rather delicate hairs. Upper and lower dorsal head hairs single; ante-antennal tuft of four hairs (some specimens have two and three, the others probably having been broken off). Lateral comb on eighth segment consisting of from 12 to 17 scales arranged in a triangular patch, each scale bearing a long terminal thorn. Air-tube short, from $2\frac{1}{2}$ to 3 times longer than wide, and tapering on the outer half; pecten extending beyond the middle and consisting of from 14 to 18 teeth, the majority of which bear a short basal tooth; the last few teeth detached (the detached teeth vary in number from 2 to 4, the widest interval occurring between the last two), and the last tooth out of line. The hair tuft of the pecten of 4 hairs, situated close to the last tooth; within the pecten in seven of the specimens, and just beyond in the other three. The anal segment ringed by the plate; the anal gills long and tapering.



Fig. 2.—Male hypopygium of *Aedes alpinus* L., (*nearcticus* Dyar), greatly enlarged; a., aedoeagus; a. l., apical lobe; b. l., basal lobe; c., claspette; c. f., claspette-filament; c. l., clasper; s. p., side-piece; 9th. t., 9th tergite; 10th. st., 10th. sternite.

The adults are identical with Dyar's (1) *Aedes nearcticus*, the type specimens of which are in the Canadian National Collection. According to Edwards (3), *A. nearcticus* Dyar is synonymous with *A. alpinus* L. Dyar (2), however, maintains the authenticity of *nearcticus* based on the following slight differences in the male genitalia; "The male hypopygium is not heavily chitinated, the aedoeagus inconspicuous; the apical lobe is larger; the claspette-filament has a broader

membranous expansion, roundedly angled in the middle. The basal lobe is as in *alpinus*, without or more rarely with a marginal spine," and on differences of structure in the larvae of *alpinus* and *nearcticus*.

There is some doubt as to whether the larvae which Dyar described as *Aedes nearcticus* actually belong to the same species as the adults which he described under the same name, for he states (1, p. 32), that the larvae were, "..... taken from a pond, Bernard Harbour, Northwest Territories, June 28, 1915 (Frits Johansen), not isolated, but present in dominating numbers, so that they doubtless belong to the abundant species, *nearcticus*." The remainder of the larvae in the collection he briefly described as *Aedes* n. sp., and they subsequently proved to be *Aedes alpinus* L.

In view of this, therefore, it is quite possible that Dyar in describing *nearcticus* associated the wrong larvae with the adults, in which case the latter are undoubtedly *alpinus*. In the accompanying sketch (Fig 2) I have figured the male hypopygium of one of the specimens from Baffin Land.

REFERENCES.

- 1.—Dyar, H. G.—"The Mosquitoes Collected by the Canadian Arctic Expedition, 1913-18." Rep. Can. Arc. Exp. III, Pt. C, 31-33, 1919.
- 2.—Dyar, H. G.—"The Mosquitoes of the Palaearctic and Nearctic Regions." Ins. Ins. Mens. X, 73-74, 1922.
- 3.—Edwards, F. W.—"A Revision of the Mosquitoes of the Palaearctic Region," Bull. Ent. Res. XII, 309, 1921.
- 4.—Wesenberg-Lund, C.—"Contributions to the Biology of the Danish Culicidae." Mem. Acad. R. Sci. & Lettres, Copenhagen, Sec. Sci. 8th Ser. VII, No. 1, p. 79, Tab. IX, 1921.

A NEW SPECIES OF MALLOCHIELLA (DIPTERA: MILICHIIDAE).*

BY C. H. CURRAN,

Ottawa, Ont.

During the summer of 1926, while collecting in Orillia, numerous small flies were observed on old fence posts in the hot sun. It was presumed that they represented some common species of Agromyzinae and only six specimens were captured after much difficulty, four of these proving to belong to a beautiful undescribed species of *Mallochiella*. In Melander's key to the Milichiinae (Jour. N. Y. Ent. Soc., XXXI, 1913) the members of this genus trace to *Hypaspistomyia* Hendel, an Asiatic genus, but the oral margin is not retracted. The carinate lunule is variable both in size and color in *M. halteralis* Coq. but always separates the antennae.

The three species referable to the genus may be separated by the key which follows:

TABLE OF SPECIES.

- | | |
|---|------------------------|
| 1. Halteres wholly black | 2. |
| Halteres whitish, the base black; cheeks and frontal orbits white, rather silvery; third antennal segment largely reddish below | <i>orillia</i> n. sp. |
| 2. Face wholly black; palpi black | <i>glabra</i> Fallen |
| Face with large white spot below in middle; palpi usually yellowish, sometimes mostly black | <i>halteralis</i> Coq. |

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Mallochiella halteralis Coquillett

Desmometopa halteralis Coq., Proc. U. S. N. M., XXII, 267, 1900.

A series of nine specimens from Lethbridge, Alta., May 31, 1920, (E. H. Strickland) shows great variation in the color of the palpi, the carina and tarsi.

The lunular carina varies from white to brown, the palpi often appear wholly black or nearly so while the front tarsi are sometimes only obscurely yellowish at the base of the first segment.

There may be some doubt about *M. glabra* belonging here. In the specimen before me, which I take to be this species, the lower part of the face is not triangularly raised and there is no pteropleural bristle such as occurs in the other two species. It might well be that a new genus should be erected for it.

Mallochiella orillia n. sp.

Black; the broad cheeks, oral triangle of the face and the lunular carina, white, the frontal orbits whitish outside the frontals, in front the bristles leave two black indentations while the orbitals arise from small black spots; anterior fourth of front reddish; the median fourth of the front with a longitudinal, thinly whitish pollinose vitta. Length, almost 2 mm.

Male. Three pairs of frontals, two below and one very near the vertex; two pairs of divergent orbitals, the anterior pair directed somewhat forward posterior pair rather reclinate; ocellars and postocellars small; verticals absent, perhaps represented by the upper frontals; outer verticals short, divergent. Ocellar triangle and occiput above cinereous pollinose, the occiput elsewhere shining black; a row of tiny bristles along lower edge of cheeks; oral vibrissae above oral margin. Palpi yellow, largely whitish, the apex below sometimes broadly black. Antennae black, cinereous pollinose, the third segment broadly reddish below.

Mesonotum, mesopleura above, a spot above front coxae, upper border of sternopleura and pleura posteriorly, including the metanotum, luteous or yellowish gray pollinose, the pteropleura less thickly so; mesonotum with five narrow brownish vittae, the median three extending to the posterior fourth, the lateral ones indistinct in front of the suture; each hair rises from a tiny blackish spot; no hairs on scutellum, which bears four marginal bristles; one pair of dorso-centrals, two posterior callar bristles, the inner one weak; one weak supra-alar. Pteropleural bristle distinct.

Legs black; coxae gray pollinose, the anterior pair shining black on basal fourth or more, broadly reddish apically; anterior four tibiae each with a basal and median white pollinose band beneath which the ground color is usually reddish; the immediate base of the first three tarsal segments is reddish yellow, the first segment broadly so. Posterior tibiae very broad, the outer surface of the hind pair concave.

Wings whitish; veins luteous, darker apically.

Abdomen opaque brownish, the sides and fourth segment polished black; venter thinly brownish pollinose.

Female.—Palpi blackish on lower border; hind tibiae not one third as wide as in male, with yellow basal band.

Holotype—♂, Orillia, Ont., June 27, 1926, (Curran); No. 2332 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—2 ♂, same data.

7.

I.

i

r

y

-

ot

r

a,

e

r

y

;

d

r,

-

g

l

e

f

-

v

l

;

-

e.

l

-

e

e

;

s

e